Phytoextraction of Zn by *Solanum nigrum*: effect of chelating agents (EDTA and EDDS) addition and inoculation with arbuscular mycorrhizal fungi

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The bioavailability of metals to the plant is considered to be a critical requirement for phytoextraction. The addition of chelating agents can increase metal availability and affect metal uptake, as well as the presence of arbuscular mycorrhizal fungi (AMF). In the present study, the influence of the addition of two different chelating agents (EDDS and EDTA) on the bioavailability of Zn in contaminated soils and on Zn tissue accumulation in Solanum nigrum L., a plant indigenous to a Portuguese metal contaminated site, was assessed when grown in contaminated soils. The response of the plant to the inoculation with different isolates of AMF was also studied. The application of either EDTA or EDDS has shown to be equally efficient in increasing the accumulation of Zn in the tissues of S. nigum, when comparing to non chelate-treated soils. S. nigrum plants accumulated up to 4735, 8267 and 7948 mgZnkg-1 in the leaves, stems and roots, respectively. However, both chelating agents were slightly harming to AMF and to S. nigrum, in spite of EDDS exposed plants presenting less signs of toxicity. Nevertheless the application of chelating agents increased water-available Zn, the level of Zn availability in water when EDDS was applied to the soil was lower than that registered for the EDTA-treated soils. When balancing the advantages and disadvantages of chelate-assisted phytoextraction using S. nigrum, it still appeared as a time-consuming and environmentally dangerous remediation technique.